KLING & FREITAG

E 90 MK II

User's Manual

Version 4.1
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Important Information, Please Read Before Use!

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Thank you for your decision to buy a KLING & FREITAG product. To guarantee a trouble-free operating of the equipment and to enable the KLING & FREITAG E 90 MK II speaker system to achieve its full potential, please read the operating instructions carefully before use.

With the purchase of an E 90 MK II System, you have acquired a speaker system with the highest possible quality and performance capabilities.

As the owner of this system, you now have a versatile and highly professional tool which, when operated properly, is a true pleasure to use.

Symbols in User's Manual

Warning	This symbol indicates the possibility of life-threatening danger and a health risk for persons. Not following these instructions may result in serious health problems including potentially fatal injuries.
Caution	This symbol indicates a possibly dangerous situation. Not following these instructions may cause minor injuries or property damage.
Important	This symbol gives instructions for the proper use of the described products. Not following these instructions may cause malfunctions or property damage.

Information about this User's Manual

User's Manual E 90 MK II Version 4.1, 23.08.20177

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All specifications in this manual are based on information available at the time of publishing for the features and safety guidelines of the described products.

Technical specifications, dimensions, weights and properties are not guaranteed.
The manufacturer reserves the right to make product alterations within legal provisions as well as changes to improve product quality.
All persons who use the speaker system must have this guide and all further information for safe operations available to them during assembly, disassembly, and use.

We appreciate any input with suggestions and improvements for this manual. Please send this to us at the following address:

info@kling-freitag.de or to:

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1. General Safety Instructions for Using Speakers

Mounting the speakers

To prevent injury or property damage, this equipment must be securely placed on the floor or secured to the wall according to the mounting instructions on page 10 (Mounting Instructions for Loudspeakers). Please note that speakers can move as a result of vibrations. To prevent them from falling from their mounted position, they must be secured properly.

Speakers may only be mounted to walls and ceilings by qualified personnel. The speakers must be hung by using at least two of the designated flying points. The same applies when lifting and aligning the speakers.

Never use signal cables or power cords for suspending, aligning or securing the systems. When laying the connecting cables, make sure that nobody can trip.

When suspending the speakers use only mounting equipment from Kling & Freitag.

Ensure that all installation connections comply with the applicable safety guidelines and that the size and strength are sufficient. Further instructions are in our user's manual for assembly equipment and in the general safety instructions for speakers and assembly equipment.

For mobile and fixed installations, use only assembly equipment from Kling & Freitag. Make sure to observe the included safety and mounting Instructions for loudspeakers and accessories.

Speakers and rigging equipment must be visually examined at regular intervals. If there are signs of wear, they must be replaced immediately. Furthermore, screwed connections of supporting parts must be checked routinely.

Protecting the speakers / avoiding fire hazard

In general, audio signals should not be overdriven. This may be caused by mixing consoles, equalizers, effect equipment, etc. and should be indicated on this equipment. When a power amplifier is overloaded at the output (clipping), then the amplifier should activate a clipping warning signal. Power amplifiers can also be overloaded at the input circuit without the amplifier signalling the clipping, i.e. when there is not sufficient headroom in the input circuit. We, therefore, recommend turning up the power amplifiers all the way and adjusting the level before the power amplifier in order to avoid overloading the input circuit. In any case, the signal must be reduced as soon as it sounds unnaturally distorted.

- To protect the speakers from being destroyed and to avoid fire hazard, they should only be operated with professional power amplifiers with the following specifications:
  - Integrated or preceding subsonic filter (approx. 20 Hz, min. 12 dB / octave)
  - Integrated clipping limiter
  - Maximum rated power 300W@8Ω (equivalent 600W@4Ω)

For damage caused by overloading or use with power amplifiers other than those recommended above, Kling & Freitag GmbH does not assume warranty and excludes liability for possible consequential damage.

The following signals may damage the speakers

- permanent high-pitched signals with high frequency and continuous noise from feedback.
- permanently distorted signals with high power.
- noises, which occur when the amplifier is on while equipment is being connected, disconnected or switched on.

Do not install speakers in any of the following places:

- where the speakers are permanently exposed to direct sunlight
- where the speakers are exposed to high moisture or rain
- where the speakers are exposed to strong vibrations and dust.

Damage caused by the speakers' magnetic fields

Speakers are permanently surrounded by a magnetic field, even when they are not operating. Therefore, during transport and placement of the speakers, it is important to ensure that there is always approx. 1 m between the speakers and magnetic data media and computer/video monitors.

Preventing hearing damage

To prevent the risk of hearing damage, avoid being too close to operating speakers, even if the volume level seems to be low enough. In general, volume levels over 90 dB can cause hearing damage.

2. E 90 MK II Product Descriptions and Versions

Short description:

2-way column speaker with 4 x 5" low-mid chassis and 1" soft-dome tweeter with ferrofluid cooling and attached horn. Integrated crossover with self-resetting protection circuit for low and high frequency path. 5" low-mid chassis with moisture resistant coating in column configuration for directivity enhancement.

Enclosure:

Trapezoidal enclosure, 15 mm birch plywood with highly resistant structured paint in black (RAL 9005), grey (RAL 7016) or white (RAL 9010), 3 x M6 thread inserts for mounting accessories, highly permeable, ball proof steel grille with exchangeable and rounded black acoustic foam in "Soft-Line" design.

The E 90 MK II with its compact construction and, at least in the standard version, its light weight, is eminently suitable for mobile use, where it has already proved itself. Its discreet design also makes the E 90 MK II suitable for fixed installations.

Special versions:

– E 90 MK II '100V': Version with 100V / 50 VA / 100 VA / 150VA toroidal transformer
– E 90 MK II 'Outdoor Mobile'
– Special finish in RAL colours

3. Important Notes for the Option 'Outdoor Mobile'

Warning

Speakers with the option ‚Outdoor' have been optimised for outdoor use. They withstand temperature fluctuations in moderate climate zones and are resistant against condensation water.

In order to guarantee the longevity and safety of the speakers, the models with the option 'Outdoor' must still be protected from direct effects of the weather.

They should be installed, for example, under a roof so that they also have sufficient protection from driving rain from the side and direct sunlight.

3.1 Features of the Option 'Outdoor Mobile'

Version for mobile outdoor use under roofs.
Features like standard version but with the following extras:

- multi-layered, temperature and UV-resistant high-tech PU marine primer,
- final coating with highly resistant structured 2K paint in RAL colours,
- waterproofed diaphragms and electronic components protected against corrosion with protective coating.

4. Instructions for Versions with '100 V' Option

Kling & Freitag speakers are fitted with high-quality toroidal transformers. This serves to minimize loss of sound quality. Highly professional sound reinforcement results can be achieved using 100 V Kling & Freitag speakers.

4.1 Reasons for choosing Speakers with 100 V Technology

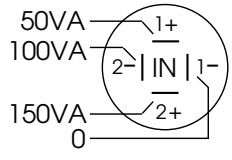
Important

- Reduction in conduction loss.
- Easy assembly of a loudspeaker network due to simple parallel wiring. **The sum of the output power of the individual speakers (stated as VA = W) must not exceed the output power of the 100 V amplifier.**
- Speakers are galvanically isolated.
- Speakers can be integrated into existing 100 V systems.

4.2 Connecting Diagram of the 100V Speaker Inputs

The 100 V transformer for the E 90 MK II has 3 taps. These enable the speaker to be operated at 50 VA, 100 VA or 150 VA. Which tap is connected to which pin can be seen below.

150VA transformer with taps for 50VA, 100VA and 150VA



5. Instructions for Suspending the Speakers

Warning

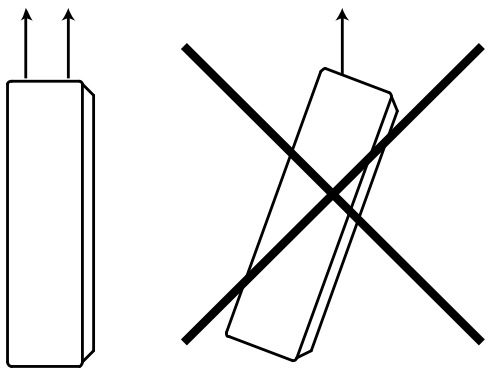
The speakers may only be suspended by trained specialised personnel.

Please follow the accompanying safety and assembly instructions carefully as well as the required safety factors. Pay attention to the corresponding national safety regulations.

Speaker systems, whether single or connected to one another, must always be secured to a second separate point.

Ensure that all connections are secured to prevent their detaching on their own and that only admissible statically tested and sufficiently sized connecting devices, ropes and chains are used.

Do not mount any additional loads to the M6 thread inserts on the bottom of the speakers.



6. Mounting Instructions for Loudspeakers

Mount the speakers securely. To avoid injury or damage, always be sure to mount the speakers securely so that they do not fall. Speakers, which are stacked, must be secured with securing straps. When laying the connecting cables, make sure that nobody can trip.

The stability of stacked systems (also valid for the use of stands and distance rods!) is contingent upon the following stability requirement. These conditions must, therefore, be guaranteed by the user:

Stacked systems may not fall over even if they are inclined by 10° in each direction. If this requirement is not fulfilled, then it is necessary to take steps to achieve compliance. Possible measures include strapping it to an appropriate base structure or fastening it using safety straps.

6.1 Proper Arrangement of the Loudspeakers

Be aware of the fact that the logical targeted alignment of this high quality speaker system can lead to a significant qualitative increase in the acoustic result. It is not possible to make generalities about the alignment of specific systems because the room has a substantial influence on the signal and the audible result.

As a rule, the mid- and high-transducers of loudspeakers should be mounted above the audience's face value, so that the sound distribution cannot be shadowed.

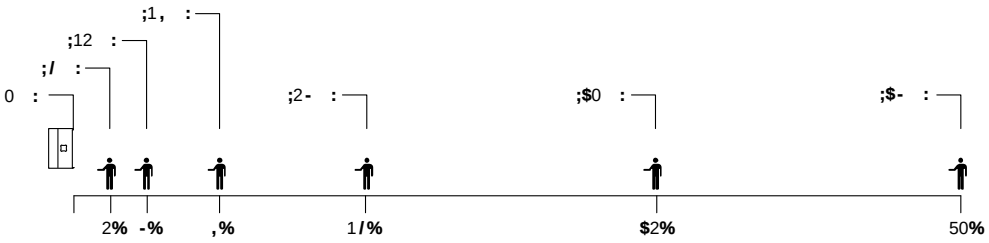
In many cases it is advisable to mount a loudspeaker higher, so that the sound will be distributed throughout the room more evenly. Low standing systems result in a greater difference in volume between front and back seats than higher standing sys-tem.

Please note that this is only a general guideline and the best possible result may vary from room to room.

To simulate the correct alignment of the speakers beforehand, there are various programs such as 'Ease' or 'Ulysses'. The Kling & Freitag speaker system data is available for download on our website www.kling-freitag.de.

The following graphics will assist in making a rough estimate as to the distance range of the E 90 MK II. The graphics only take into consideration the sum of the direct sound and not the influence of the room. Because of this there can, in some cases, be noticeable deviation.

Distance range of SPL (direct sound level):



7. Wiring

The speaker is equipped with two parallel Speakon connectors.

– Make sure that all units are switched off and all controls are turned down before connecting your E 90 MK II systems.

– We recommend the use of high-quality speaker cables provided by Kling & Freitag.

– For connections from the mixer to the power amplifier inputs, please use 2-pin shielded microphone cable with high-quality connectors.

– Avoid ground loops (see chapter 7.2)

– Please pay attention to the respective pin diagrams in this manual!

– Make sure that the +/- polarity of the speakers at the amplifier is correct. When simultaneously using power amplifiers from different manufacturers, be sure to use the correct specific pin configuration. It may be necessary to modify the pin configuration on the power amplifiers or on the connectors leading to them.

– Upon completing the wiring, ensure that the connected speaker channels are working in phase. To do so, use i.e. a phase checker. A phase error can also be recognised when the connected channels are used simultaneously. During simultaneous use the bass frequencies become notably quieter or the mid-frequencies such as voices cannot be located.

Important

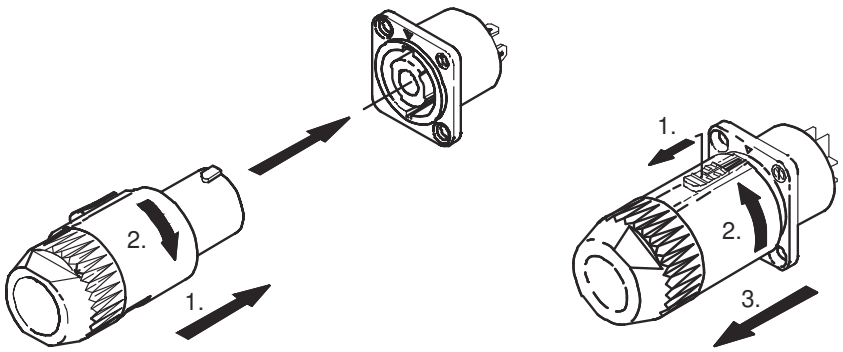
– To avoid loss of power, the cables should have a minimum wire gauge of 2.5 mm² - more for longer cabled distances. A minimum wire gauge can be easily calculated with the following formula:

$$\text{Minimum Wire Gauge (mm}^2\text{)} = \frac{\text{Required Cable Length (m)}}{2 \times \text{Speaker Impedance } (\Omega)}$$

If several loudspeakers are connected, the signal can be linked through from one loudspeaker to the next. Please make sure that the total impedance of the loudspeakers R(Ω) is not lower than the minimal impedance indicated on the power amplifier.

$$1/R_1 + 1/R_2 + 1/R_3 + \ldots = 1/R_{total}$$

7.1 Connecting the Speakon Connector to the Terminal



7.2 Avoiding Ground Loops

7.2.1 What is a Ground Loop?

Every component of a P.A. or Hi-Fi System has its own internal 0 V reference (ground). This point is often connected to the protective earth connector (PE / Ground). If two or more units are connected to one another with a line level audio cable, there may be a ground connection through the ground of the power supply cable (yellow-green) as well as through the shielding of the audio cable. The voltage difference between these two ground points causes audible interference to come from the speaker.

7.2.2 Avoiding Ground Loops

If there is a loud humming or buzzing after the E 90 MK II system has been connected, then check that a "ground loop" has not been built into the system. Some power amplifiers and system controllers are equipped with a "Ground Lift" switch. Set these switches to the "Lift" position one after the other. If the noise is still audible, check if,

- the noise is caused by a ground loop before the power amplifiers / controllers (e.g. mixing console, effects or equalizers).
- the system or parts of the system are connected to an "unclean" power supply - meaning one, which is also running large motors, or lighting systems. An "unclean" supply voltage, electrostatic and electromagnetic fields can cause a malfunction.

Please observe the following basic rules:

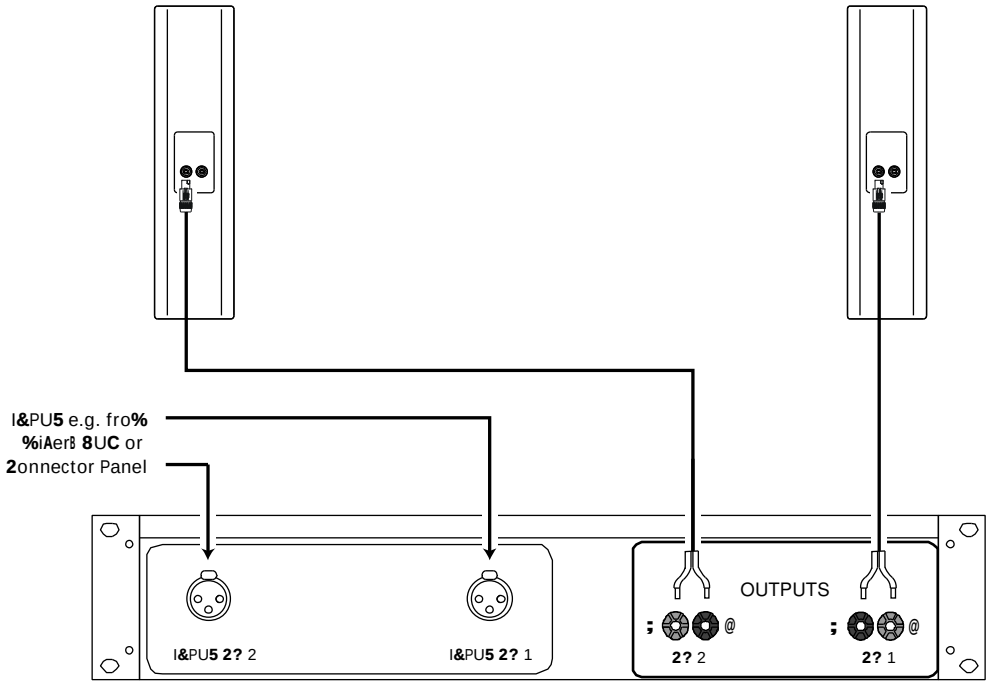
- **Never!!! try to avoid a ground loop by disconnecting or taping the ground contact at the power connector! Extremely dangerous!**
- If possible, only use high-quality audio appliances with balanced signal outputs and with power cables with PE connectors.
- Use high-quality cables with good shielding.
- The point of ground for all connected components should merge at one central point. The power connections should lead out in a radial manner from one point and not be linked from one unit to the next.
- When installing appliances that create strong electrostatic or electromagnetic fields (large transformers, switch-mode power supplies), maintain some distance from other audio appliances. In extreme cases, the only solution is to create a completely independent 'audio ground'; in other cases, it is sufficient to connect a filter in front of the audio equipment.

8. Configurations and Connecting Diagrams

- To protect the speakers from being destroyed and to avoid fire hazard, they should only be operated with professional power amplifiers with the following specification:
  - integrated or preceding subsonic filter (approx. 30 Hz, min. 12 dB / octave)
  - integrated clipping limiter
  - maximum rated power 300W@8Ω (equivalent 600W@4Ω)

8.1 E 90 MK II Systems in Full-Range Mode

This mode of operation is ideal for speech applications and music applications without the need for a high bass content. Should more bass be needed, the bass level can be increased between 50 and 80 Hz at the mixing console.



8.2 Full Range Mode & Subwoofer with Crossover (XO)

In this mode of operation you can easily realise applications, where a higher bass level is needed.

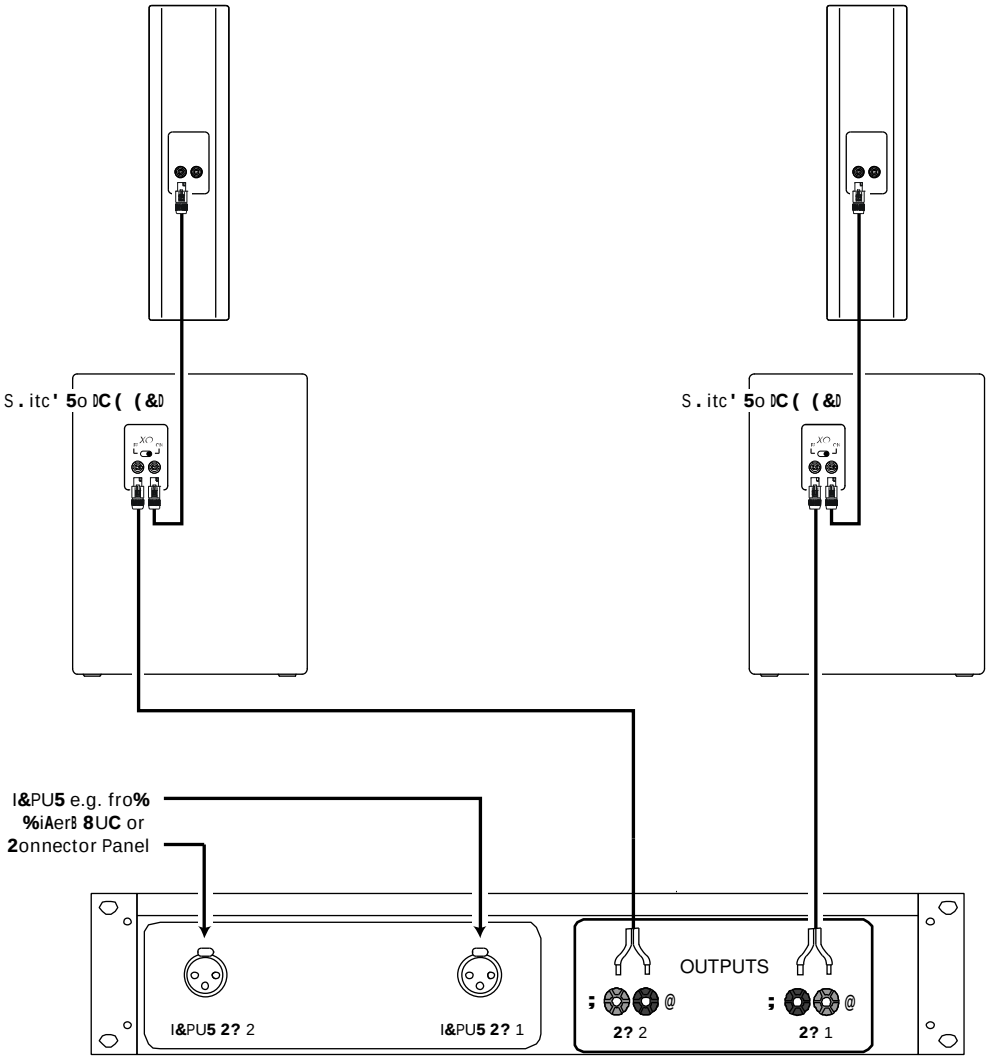
Recommended combinations of E 90 MK II systems with K&F subwoofers:

2 E 90 MK II systems: 1 - 2 x SW 112-XO

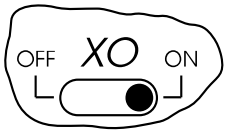
2 - 4 E 90 MK II systems: 1 x SW 115D-XO

2 - 4 E 90 MK II systems: 1 x SW 115E-XO

2 - 4 E 90 MK II systems: 1 x SW 118E-XO



The switch 'XO' on the connecting terminal of the subwoofer must be at 'XO ON' or 'PASSIVE' for this mode of operation:



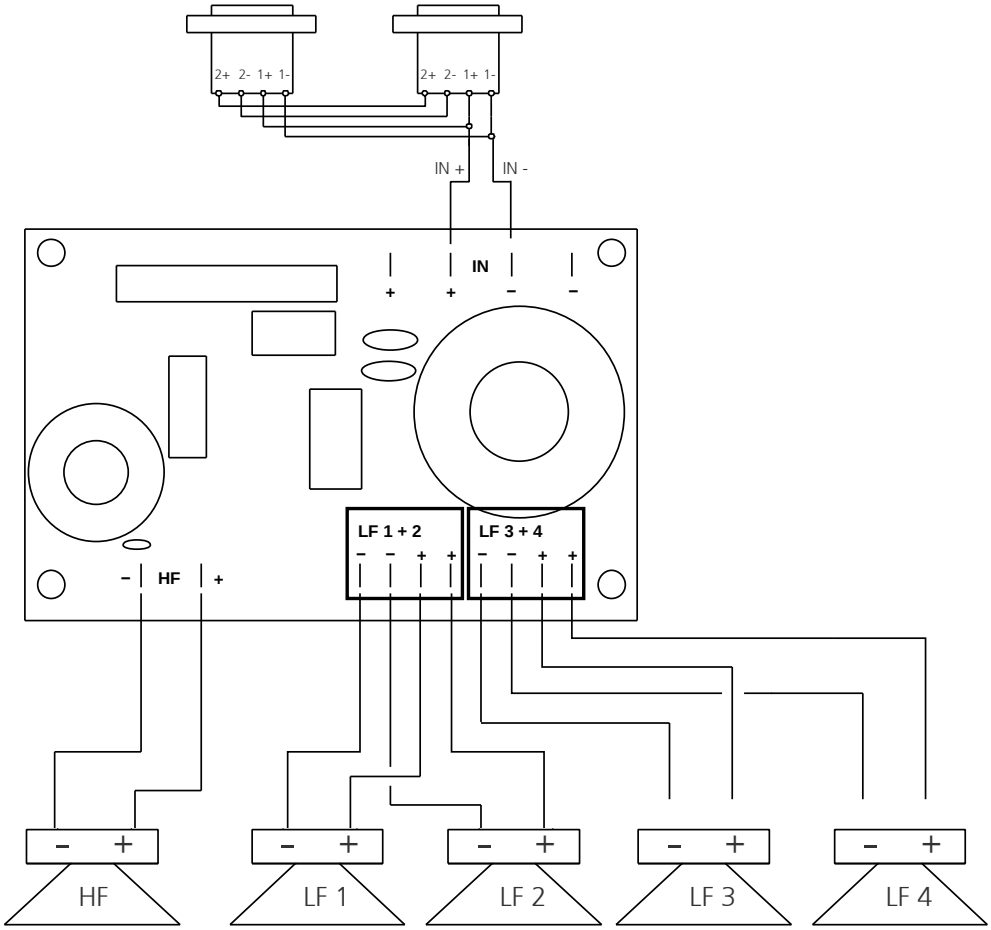
Switch on the subwoofer's connecting terminal

9. Operating the Speakers

Important

- Switch off all equipment and turn down all level controls.
- Wire the E 90 MK II systems according to the wiring diagrams as shown before.
- Upon completing the wiring, ensure that the connected speaker channels are working in phase. To do so, use i.e. a phase checker. A phase error can also be recognized when the connected channels are used simultaneously. During simultaneous use the bass frequencies become notably quieter or the mid-frequencies such as voices cannot be located.
- Now switch on the peripheral equipment first (mixing console, effects etc.), followed by the power amplifiers. Always use the before mentioned switching order. Otherwise switching noises may damage the system.
- If there is interference, turn off all appliances in the reverse order and check all cable connections (see chapter 7.2).
- Now put a low level signal into the system and check for the correct function of the system. In doing so, all amplifier input controls need to be turned off again. Now turn on the control for the left E 90 MK II system and check that the correct signal is coming out of the E 90 MK II system.
- Your system should now be ready for operation.
- Turning down the input level controls may not always prevent distortions in the input section of the power amplifier, especially if this section has a relatively low headroom. A clipping signal may not be displayed by the clipping indicator then. To prevent signal interruptions or damages to the speakers, turn the level controls of the power amplifier to the maximum position, if possible. The output level of the mixing console or the controller should be set to a level that doesn't overload the power amplifiers.
- When turning off the system, the input controls for the power amplifiers should be turned down first followed by the power switches of the amplifiers. After that, the other appliances can be turned off.
- The crossovers of the E 90 MK II systems are equipped with protection circuits for the 1'' and 5'' drivers. These circuits cut off the signal current when highly overloaded. If the high speaker turns off, reduce the volume. After a few seconds, it will turn back on automatically.

10. Crossover: Wiring Diagram E 90 MK II



Pin assignment Speakon NL4				
	+	-	/	/
'IN'	1+	1-	2+	2-
'OUT'	parallel with 'IN'			

11. Touching Up Damage to Paint / Changing the Front Foam

Although the PU structured paint used by KLING & FREITAG is impact proof and extremely resistant, we recommend using protective coverings or cases to help avoid damaging the paint during i.e. continuous mobile use. If paint damage occurs despite these precautions, it can be touched up by using commercial acrylic paint in the appropriate RAL colour of the speaker.

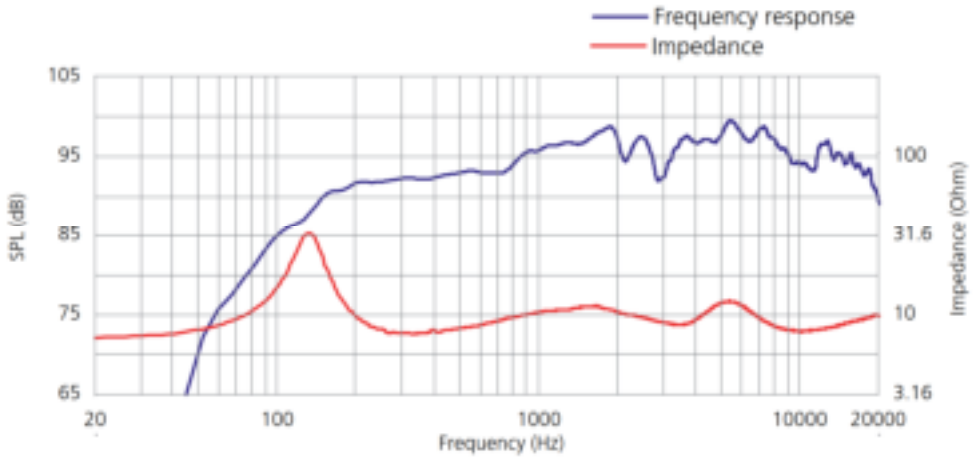
To replace the filter foam, send the front grille incl. foam to KLING & FREITAG GmbH. Upon payment for expenses, the grille with the new covering will be returned.

12. Technical Specifications

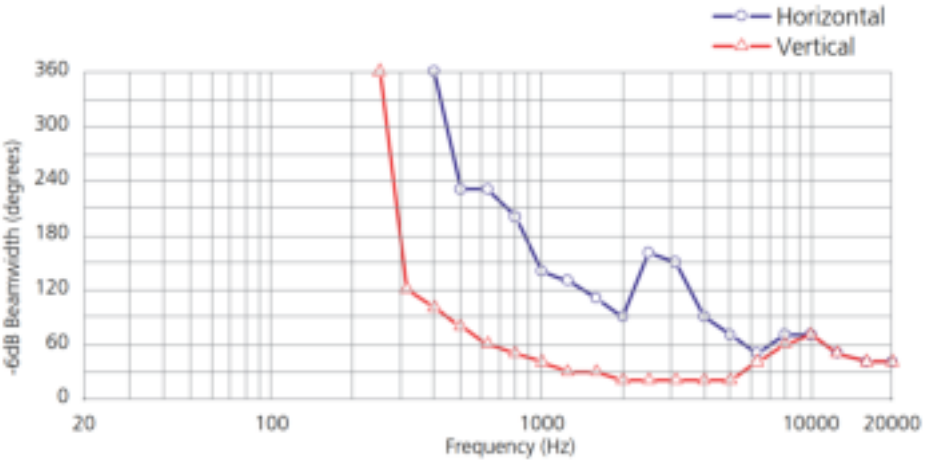
Loudspeaker	
Design	2-way passive system, column speaker
Frequency range -10 dB	95 Hz - 20 kHz
Frequency range ±3 dB	140 Hz - 18 Hz
Coverage angles (nominal)	100° x 20° TT, 70° x 70° HT (hor. x vert.)
Directivity index (DI)	9 (+3.5/-2.5) 800 Hz - 12 kHz
Power handling (nominal)	150 W nominal
	250 W programme
SPL 2.83 V / 1 m	96 dB
Max. SPL	122 dB (SPL peak / 1 m)
Components	5'' low-mid chassis (4 x)
	1'' soft dome tweeter with ferrofluid cooling
	and attached horn
Crossover	3.5 kHz 18 dB / octave
	self-resetting protection circuit for
	5'' and 1'' drivers
Impedance	8 Ω, Zmin. 7.2 Ω
Connectors	2 x Speakon NL4MP (1+/1-)
Enclosure	
	Trapezoidal enclosure, 15 mm frame-reinforced
	Finnish birch Multiplex with highly resistant
	structured black or white paint (PU)
	3 x M 6 thread inserts, compatible with
	various mounting accessories,
	ball proof steel grille with exchangeable,
	acoustic foam covering with rounded edges
	in 'Soft-Line' design
Dimensions (W x H x D)	170 x 670 x 200 mm
Weight	9.7 kg / 11.5 kg '100 Volt'
Options	'100 Volt' with 50/100/150 VA toroidal
	transformer
	'Terminal clamp' instead of Speakon connector
	'Outdoor Mobile'
	'Special finish in RAL colours'
Accessories	see catalogue or visit www.kling-freitag.de

13. Measuring Charts

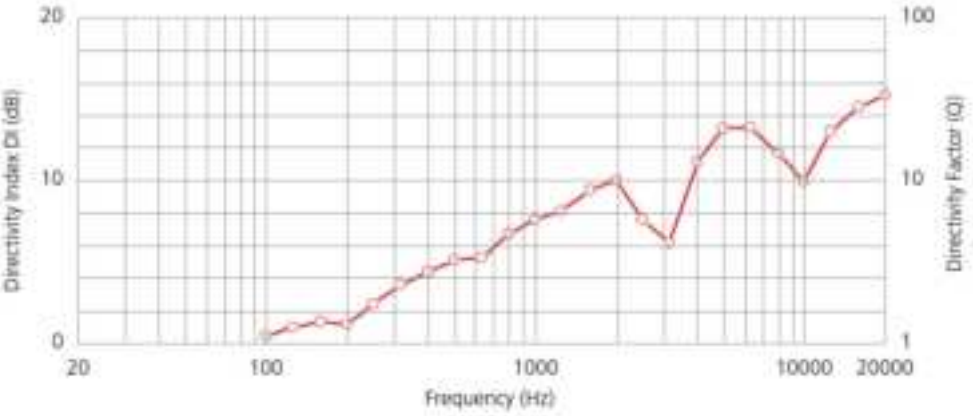
Frequency response



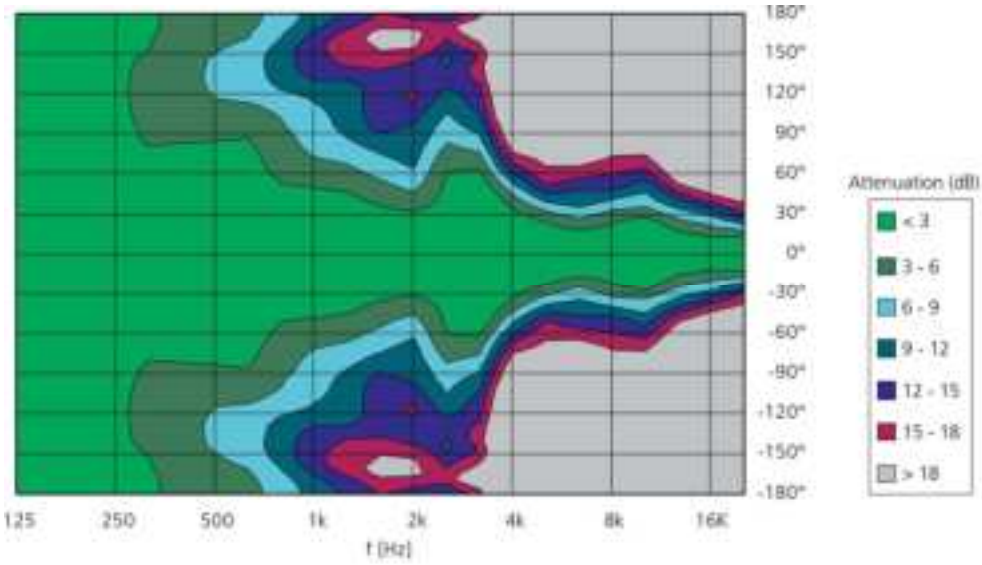
Beamwidth



Directivity



Horizontal coverage



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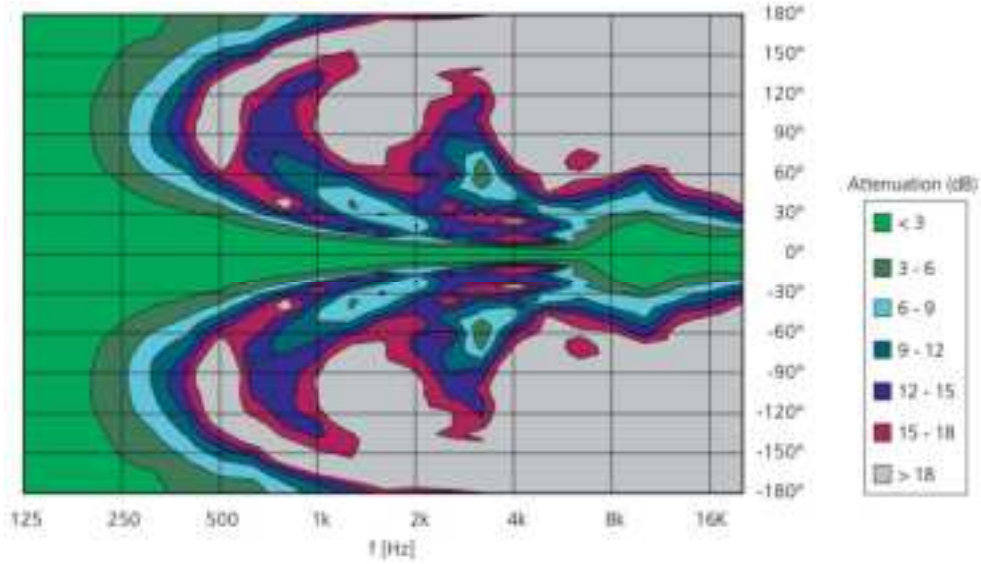
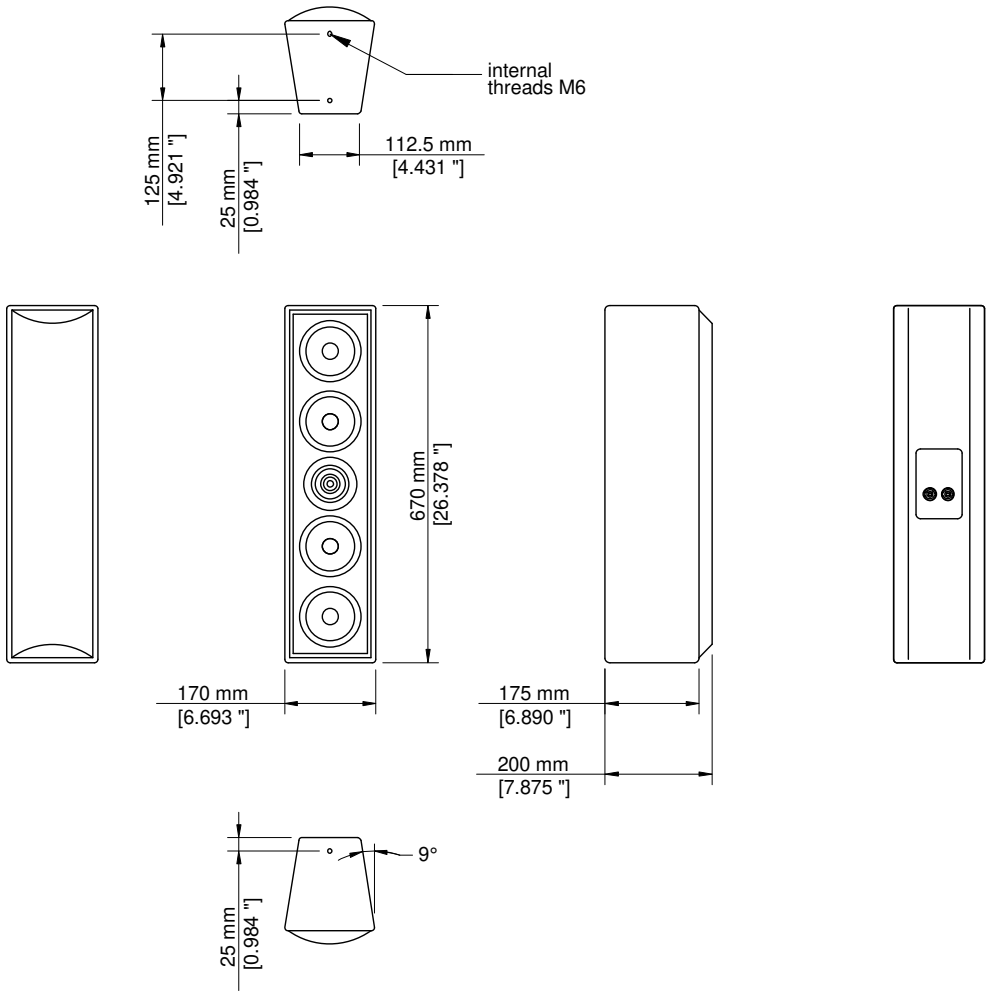
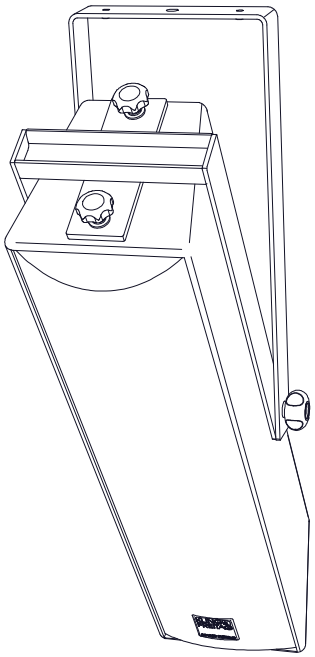
Vertical coverage



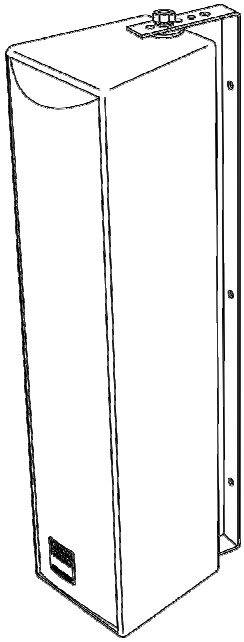
14. Dimensions



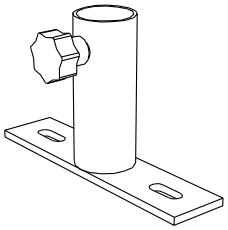
15. Accessories



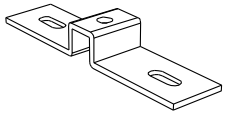
Adjustable speaker mount E 90



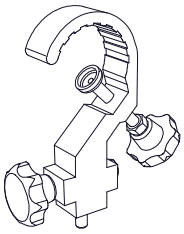
U-mount E 90



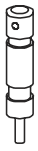
Stand adapter



TV-spigot adapter



Pipe Clamp



TV-spigot

Eyebolt
M6 x 15

Further information is available in our downloadable catalogue at:
www.kling-freitag.de

16. Regulations for Disposal

16.1 Germany:

It is not allowed to dispose of used electrical equipment as domestic waste.

But please do not dispose of them at official collecting points for recycling either!

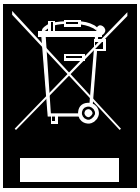
All Kling & Freitag products are plain business-to-business (B2B) products. Disposal of Kling & Freitag products labelled with a waste bin sign have thus to be disposed of by Kling & Freitag alone. Please call Kling & Freitag at the number stated below if you have a Kling & Freitag product to be disposed. We will offer you a straightforward and professional disposal not affecting costs.

If there is no dustbin sign on one of your Kling & Freitag products, because they have been sold before March 2006 then by law the owner is in charge of the disposal. For these we will be happy to assist and offer you proper ways of disposal.

Telephone number to call about the disposal of used Kling & Freitag products: +49 (511)-96 99 7-0

Explanation:

With the ElektroG (law relating to electrical and electronic equipment and appliances) we have complied with the EU-directive on waste electrical and electronic equipment (WEEE, 2002/96/EC)



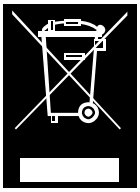
The Kling & Freitag AG has thus labelled all products mentioned in the WEEE from 03/24/2006 onwards with a sign with a crossed out waste bin and a white bar below. This sign indicates that the disposal into the domestic waste is prohibited and that the product has been put into circulation at the 03/24/2006 earliest.

The Kling & Freitag GmbH has been legally registered as a manufacturer with the registration office EAR. Our WEEE Registration-Nr. is: DE64110372

For the German Registration office EAR we have accredited that our products are sole B2B products.

16.2 EU, Norway, Island, and Liechtenstein (not Germany):

It is not allowed to dispose of used electrical equipment as domestic waste.



The Kling & Freitag AG has thus labelled all products coming from EU-Member countries as well as Norway, Island and Liechtenstein (except Germany) mentioned in the WEEE from 08/13/2005 onwards with a sign with a crossed out waste bin and a white bar below. This sign indicates that the disposal into the domestic waste is prohibited and that the product has been put into circulation at the 08/13/2005 earliest.

Unfortunately the European directive WEEE has been complied with implementing different national provisions of law throughout all member countries, which makes it impossible for us to offer consistent solutions for the disposal throughout Europe.

Responsible for complying with these provisions of law is the local distributor (importer) of each country.

For proper disposition of used products in accordance with these local provisions in the mentioned countries of the European Union (except Germany) please ask your local dealer or the local authorities.

16.3 Other countries

For proper disposition of used products in accordance with local provisions in other countries please ask your local dealer or the local authorities.